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Code

This is an R Markdown (http://rmarkdown.rstudio.com) Notebook. When you execute code within the notebook, the results appear beneath the code.

Try executing this chunk by clicking the *Run* button within the chunk or by placing your cursor inside it and pressing *Ctrl+Shift+Enter*.

Add a new chunk by clicking the *Insert Chunk* button on the toolbar or by pressing *Ctrl+Alt+I*.

When you save the notebook, an HTML file containing the code and output will be saved alongside it (click the *Preview* button or press *Ctrl+Shift+K* to preview the HTML file).

The preview shows you a rendered HTML copy of the contents of the editor. Consequently, unlike *Knit*, *Preview* does not run any R code chunks. Instead, the output of the chunk when it was last run in the editor is displayed. # 2.15 Writing R functions

Hide

```
arithmetic.mean <- function(x) sum(x)/length(x)
```

```
Warning message:
In for (i in seq_along(cenv$extra)) { : closing unused connection 3 ()
```

Hide

```
y <- c(3,3,4,5,5)
arithmetic.mean(y)
```

```
[1] 4
```

Hide

```
# there is a built-in function for arithmetic means called mean
mean(y)
```

```
[1] 4
```

#2.15.2 Median of a single sample

Hide

```
med <- function(x) {
  odd.even <- length(x)%%2
  if (odd.even == 0) (sort(x)[length(x)/2]+sort(x)[1+ length(x)/2])/2
  else sort(x)[ceiling(length(x)/2)]
}
med(y)
```

```
[1] 4
```

Hide

```
med(y[-1])
```

```
[1] 4.5
```

Hide

```
med <- function(x) ifelse(length(x)%%2==1, sort(x)[ceiling(length(x)/2)],
                          (sort(x)[length(x)/2]+sort(x)[1+ length(x)/2])/2 )
```

2.15.3 Geometric mean

Hide

```
100000^0.2
```

```
[1] 10
```

Hide

```
insects <- c(1,10,1000,10,1)
mean(insects)
```

```
[1] 204.4
```

Hide

```
exp(mean(log(insects)))
```

```
[1] 10
```

Hide

```
geometric <- function (x) exp(mean(log(x)))
geometric(insects)
```

```
[1] 10
```

2.15.4 Harmonic mean

Hide

```
harmonic <- function (x) 1/mean(1/x)
harmonic(c(1,2,4,1))
```

```
[1] 1.454545
```

2.15.6 Degrees of freedom

Hide

```
y <- c(13,7,5,12,9,15,6,11,9,7,12)
variance <- function(x) sum((x - mean(x))^2)/(length(x)-1)
variance(y)
```

```
[1] 10.25455
```

Hide

```
var(y)
```

```
[1] 10.25455
```

2.15.7 Variance ratio test

Hide

```
variance.ratio <- function(x,y) {
  v1 <- var(x)
  v2 <- var(y)
  if (var(x) > var(y)){
    vr <- var(x)/var(y)
    df1 <- length(x)-1
    df2 <- length(y)-1}
  else {
    vr <- var(y)/var(x)
    df1 <- length(y)-1
    df2 <- length(x)-1}
  2*(1-pf(vr,df1,df2)) }

a <- rnorm(10,15,2)
b <- rnorm(10,15,4)
variance.ratio(a,b)
```

```
[1] 0.01548469
```

Hide

```
# We can compare our p with the p value given by the built-in function called var.test:
var.test(a,b)
```

```

    F test to compare two variances

data:  a and b
F = 0.17332, num df = 9, denom df = 9, p-value = 0.01548
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.04304911 0.69776703
sample estimates:
ratio of variances
         0.1733155
```

2.15.8 Using variance

Hide

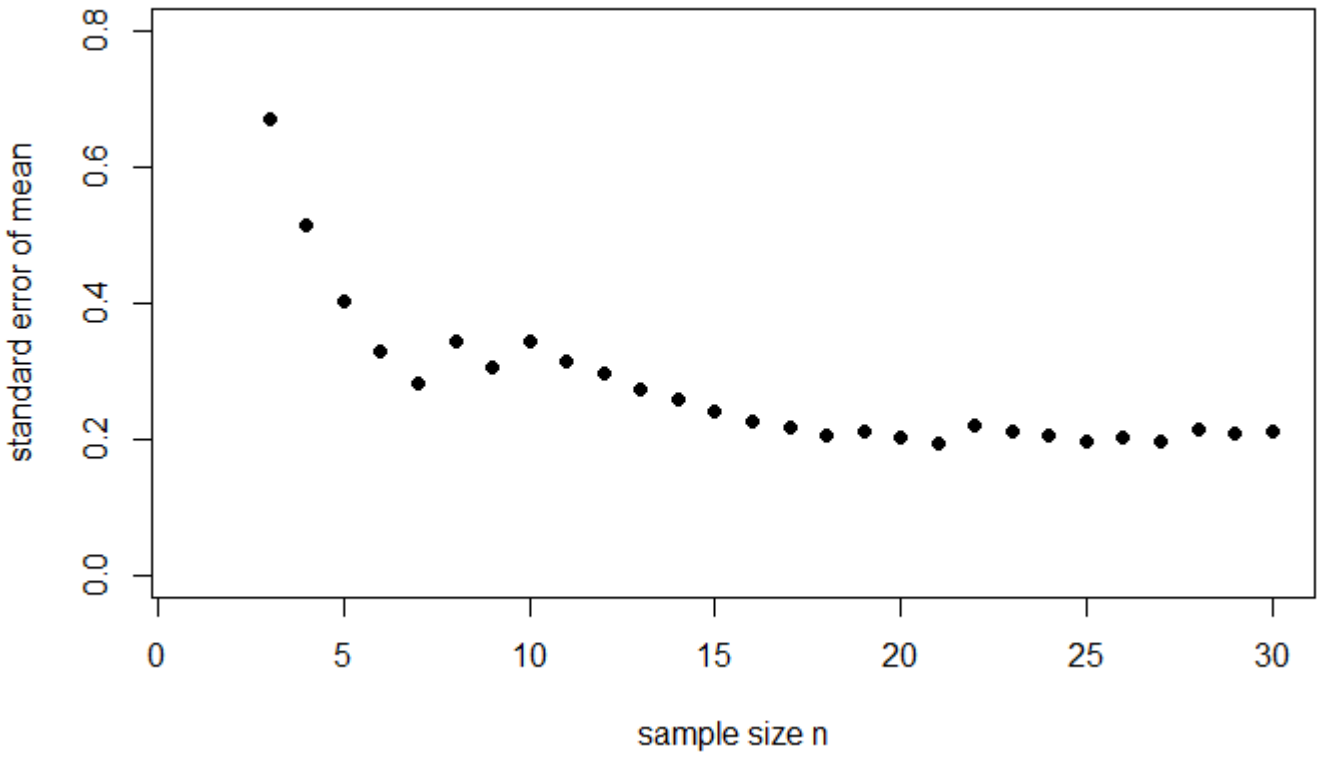
```
se <- function(x) sqrt(var(x)/length(x))
ci95 <- function(x) {
  t.value <- qt(0.975,length(x)-1)
  standard.error <- se(x)
  ci <- t.value*standard.error
  cat("95 Confidence Interval = ", mean(x) -ci, "to ", mean(x) +ci,"\n") }

x <- rnorm(150,25,3)
ci95(x)
```

```
95 Confidence Interval =  24.5983 to  25.54771
```

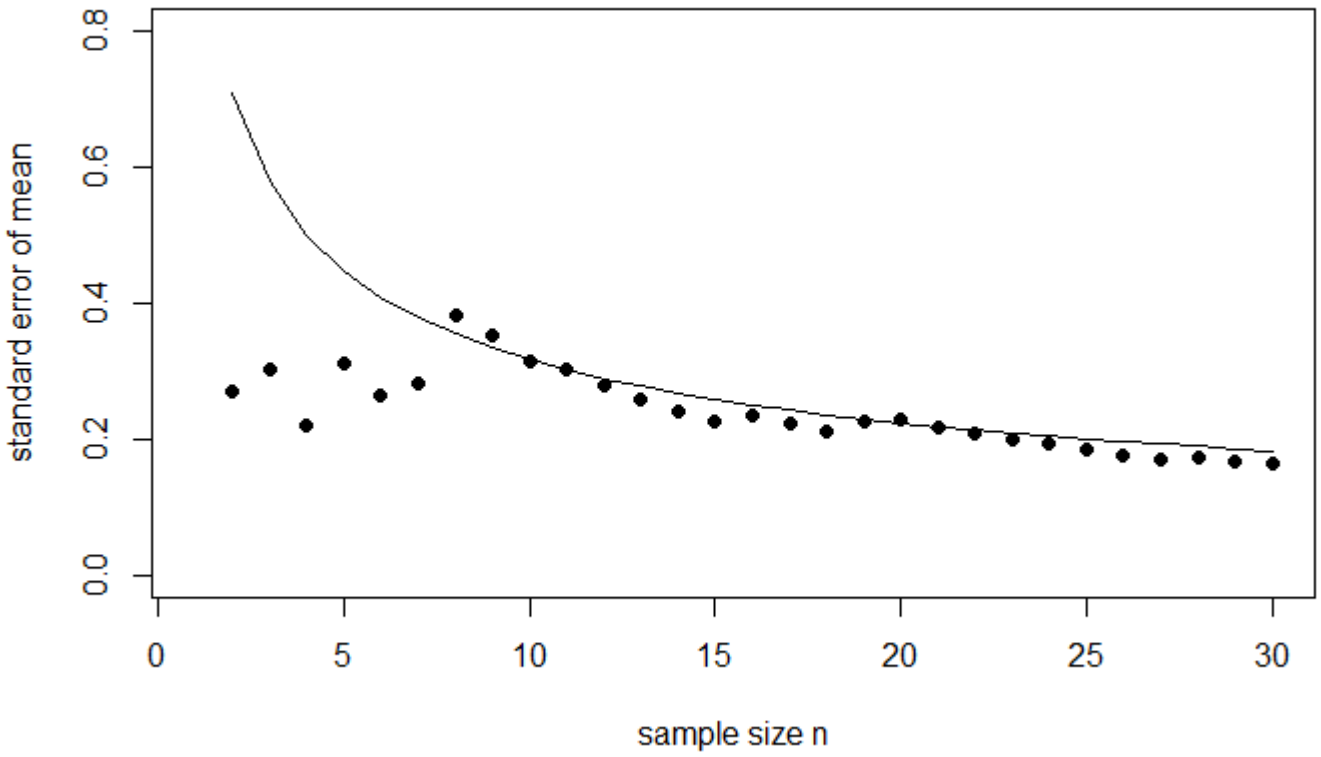
Hide

```
xv <- rnorm(30)
sem <- numeric(30)
sem[1] <- NA
for(i in 2:30) sem[i] <- se(xv[1:i])
plot(1:30,sem,ylim=c(0,0.8),
     ylab="standard error of mean",xlab="sample size n",pch=16)
```



Hide

```
xv <- rnorm(30)
sem <- numeric(30)
sem[1] <- NA
for(i in 2:30) sem[i] <- se(xv[1:i])
plot(1:30,sem,ylim=c(0,0.8),
     ylab="standard error of mean",xlab="sample size n",pch=16)
lines(2:30,1/sqrt(2:30))
```



2.15.9 Deparsing: A graphics function for error bars

Hide

```
error.bars <- function(yv,z,nn){
  xv <-
    barplot(yv,ylim=c(0,(max(yv)+max(z))),names=nn,ylab=deparse(substitute(yv)
    ))
  g=(max(xv)-min(xv))/50
  for (i in 1:length(xv)) {
    lines(c(xv[i],xv[i]),c(yv[i]+z[i],yv[i]-z[i]))
    lines(c(xv[i]-g,xv[i]+g),c(yv[i]+z[i], yv[i]+z[i]))
    lines(c(xv[i]-g,xv[i]+g),c(yv[i]-z[i], yv[i]-z[i]))
  }}

comp <- read.table("competition.txt",header=T)
```

```
cannot open file 'competition.txt': No such file or directoryError in file(file, "rt") : cannot
open the connection
```

2.15.10 The switch function

Hide

```
central <- function(y, measure) {
  switch(measure,
         Mean = mean(y),
         Geometric = exp(mean(log(y))),
         Harmonic = 1/mean(1/y),
         Median = median(y),
         stop("Measure not included")) }

central(rnorm(100,10,2),"Harmonic")
```

```
[1] 9.486829
```

Hide

```
central(rnorm(100,10,2),4)
```

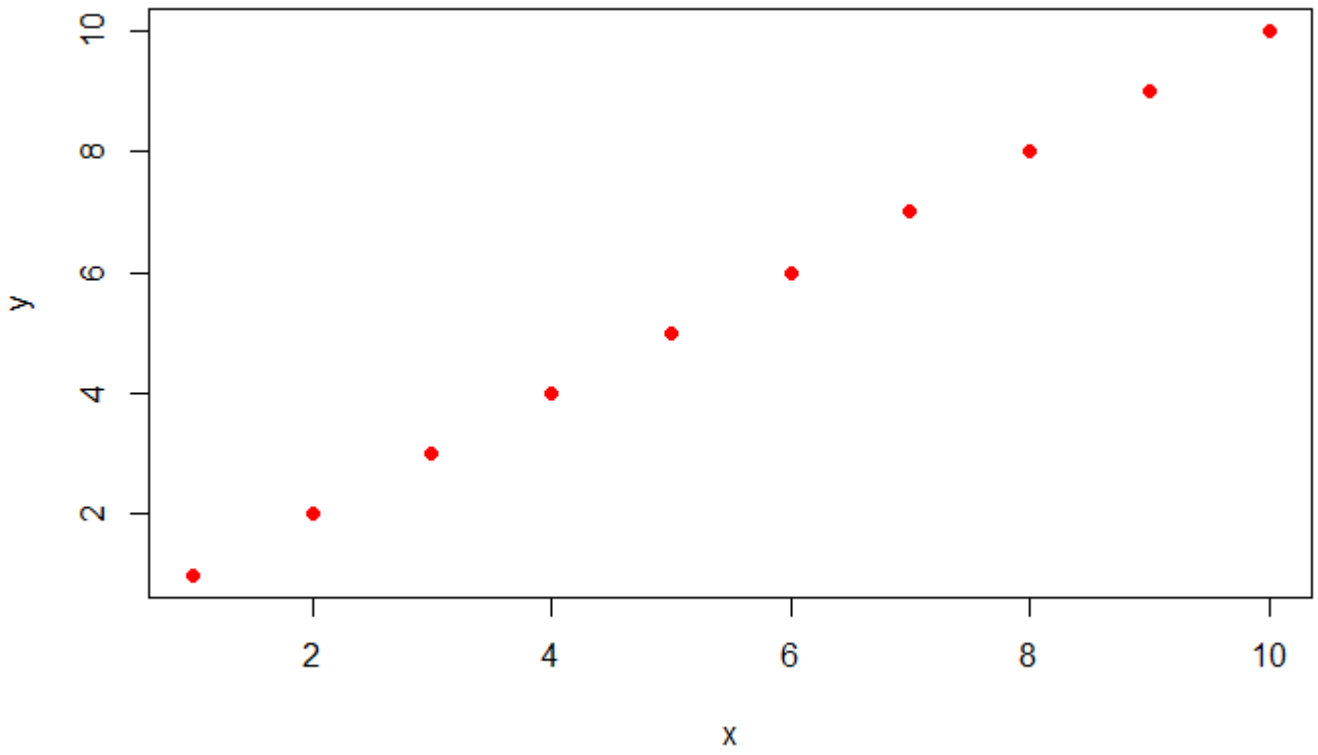
```
[1] 10.25493
```

2.15.13 Optional arguments

Hide

```
charplot <- function(x,y,pc=16,co="red"){
  plot(y~x,pch=pc,col=co)}

charplot(1:10,1:10)
```



Hide

```
plot(y~x,pch=pc,col=co)
```

```
Error in FUN(X[[i]], ...) : object 'pc' not found
```

2.15.14 Variable numbers of arguments (. . .)

Hide

```
many.means <- function ( ...) {
  data <- list( ...)
  n <- length(data)
  means <- numeric(n)
  vars <- numeric(n)
  for (i in 1:n) {
    means[i] <- mean(data[[i]])
    vars[i] <- var(data[[i]])
  }
  print(means)
  print(vars)
  invisible(NULL)
}

x <- rnorm(100)
y <- rnorm(200)
z <- rnorm(300)

many.means(x,y,z)
```

```
[1] -0.07634578 -0.01220554 -0.03014504
[1] 0.8730517 1.1588935 0.9501070
```

2.15.15 Returning values from a function

Hide

```
parmax <- function (a,b) {
  c <- pmax(a,b)
  median(c) }

x <- c(1,9,2,8,3,7)
y <- c(9,2,8,3,7,2)
parmax(x,y)
```

```
[1] 8
```

Hide

```
parboth <- function (a,b) {
  c <- pmax(a,b)
  d <- pmin(a,b)
  answer <- list(median(c),median(d))
  names(answer)[[1]] <- "median of the parallel maxima"
  names(answer)[[2]] <- "median of the parallel minima"
  return(answer) }

parboth(x,y)
```

```
$`median of the parallel maxima`
[1] 8

$`median of the parallel minima`
[1] 2
```

2.15.16 Anonymous functions

Hide

```
(function(x,y){ z <- 2* x^2 + y^2; x+y+z })(0:7, 1)
```

```
[1]   2   5  12  23  38  57  80 107
```

2.15.17 Flexible handling of arguments to functions

Hide

```
# 2.15.17 Flexible handling of arguments to functions
plotx2 <- function (x, y = z^2) {
  z <- 1:x
  plot(z,y,type="l") }

windows(7,4)
par(mfrow=c(1,2))
plotx2(12)
plotx2(12,1:12)
```

2.15.18 Structure of an object: str

Hide

```
(y <- seq(0.9,0.3,-0.1))
```

```
[1] 0.9 0.8 0.7 0.6 0.5 0.4 0.3
```

Hide

```
str(y)
```

```
 num [1:7] 0.9 0.8 0.7 0.6 0.5 0.4 0.3
```

Hide

```
#data <- read.table("c:\\temp\\spino.txt",header=T)
data <- read.table("spino.txt",header=T)
```

```
cannot open file 'spino.txt': No such file or directoryError in file(file, "rt") : cannot open t
he connection
```

2.16

Hide

```
# 2.16.2 Saving history
history(Inf)
savehistory(file = "session18.txt")
loadhistory(file = "session18.txt")

# 2.16.3 Saving graphics
pdf("fig1.pdf")
dev.off()
```

```
null device
          1
```

Hide

```
# 2.16.4 Saving data produced within R to disc
nbnumbers <- rnbinom(1000, size=1, mu=1.2)
write(nbnumbers,"nbnumbers.txt",1)
xmat <- matrix(rpois(100000,0.75),nrow=1000)
write.table(xmat,"table.txt",col.names=F,row.names=F)

nbtable <- table(nbnumbers)
nbtable
```

```
nbnumbers
  0   1   2   3   4   5   6   7   8   9  10
461 255 121  73  38  25  11   6   4   3   3
```

Hide

```
write.table(nbtable,"table.txt",col.names=F,row.names=F)
write.table(unclass(nbtable),"table.txt",col.names=F,row.names=F)

# 2.16.5 Pasting into an Excel spreadsheet
writeClipboard(as.character(factor.name))
```

```
Error in writeClipboard(as.character(factor.name)) :
  object 'factor.name' not found
```

3.1

Hide

```
y <- c (6,7,3,4,8,5,6,2)

x <-scan()
1
2
3
4
5
6
7
9
```

```
Read 8 items
```

Hide

```
setwd("c:\Users\Nathan\Desktop\Important Docs\school\stats db\therbook")
```

```
Error: '\U' used without hex digits in character string starting ""c:\U"
```

3.2 Data input from files

Hide

```
setwd("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook")
getwd()
```

```
[1] "C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook"
```

3.2.2 Data input using read.table

Hide

```
setwd("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook")
data <- read.table("yields.txt",header=T)
head(data)
```

	sand <int>	**clay** <int>	**loam** <int>
1	6	17	13
2	10	15	16

	sand <int>	clay <int>	loam <int>
3	8	3	9
4	6	11	12
5	14	14	15
6	17	12	16

6 rows

Hide

```
data <- read.delim("yields.txt")
rt <- function(x) read.table(paste("c:/Users/Nathan/Desktop/Important Docs/school/stats db/therb
ook",x,".txt",sep=""),
header=TRUE)
data <- rt("yields.txt")
```

```
cannot open file 'c:/Users/Nathan/Desktop/Important Docs/school/stats db/therbookyields.txt.tx
t': No such file or directoryError in file(file, "rt") : cannot open the connection
```

Hide

```
map <- read.table("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/bowens.csv",h
eader=T,sep=",")
murder <- read.table("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/murders.tx
t",header=T,as.is="region")
data2 <- read.table("http://www.bio.ic.ac.uk/research/mjcraw/therbook/data/cancer.txt",header=T)
head(data2)
```

	death <int>	treatment <fctr>	status <int>
1	4	DrugA	1
2	26	DrugA	1
3	2	DrugA	1
4	25	DrugA	1
5	7	DrugA	1
6	6	DrugA	0

6 rows

3.3 Input from files using scan

Hide

```
read.table("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt")
```

```
Error in scan(file = file, what = what, sep = sep, quote = quote, dec = dec,  :
  line 1 did not have 4 elements
```

3.3.2 Input from more complex file structures using scan

Hide

```
scan("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt")
```

```
Read 10 items
```

```
 [1]  138   27   44   19   20  345   48  115 2366   59
```

Hide

```
scan("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt",sep="\n")
```

```
Read 5 items
```

```
[1]       138      2744 192034548   1152366        59
```

Hide

```
scan("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt",sep="\t")
```

```
Read 20 items
```

```
 [1]  138   NA   NA   NA   27   44   NA   NA   19   20  345   48  115 2366   NA   NA   59   NA
NA   NA
```

Hide

```
length(scan("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt",sep="\n"))
```

```
Read 5 items
```

```
[1] 5
```

Hide

```
length(scan("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt",sep="\t"))
```

```
Read 20 items
```

```
[1] 20
```

Hide

```
scan("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt",sep="\t")[1:4]
```

```
Read 20 items
```

```
[1] 138  NA  NA  NA
```

Hide

```
as.numeric(na.omit(scan("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt"
,sep="\t",quiet=T)[1:4]))
```

```
[1] 138
```

Hide

```
sapply(1:5, function(i)
  as.numeric(na.omit(
    scan("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt",sep="\t",quiet
=T)[(4*i-3):
                                            (4*i)])))
```

```
[[1]]
[1] 138

[[2]]
[1] 27 44

[[3]]
[1]  19  20 345  48

[[4]]
[1]  115 2366

[[5]]
[1] 59
```

3.4 Reading data from a file using readLines

Hide

```
line<-readLines("worms.txt")
line
```

```
 [1] "Field.Name\tArea\tSlope\tVegetation\tSoil.pH\tDamp\tWorm.density" "Nashs.Field\t3.6\t11\tG
rassland\t4.1\tF\t4"
 [3] "Silwood.Bottom\t5.1\t2\tArable\t5.2\tF\t7"                        "Nursery.Field\t2.8\t3\t
Grassland\t4.3\tF\t2"
 [5] "Rush.Meadow\t2.4\t5\tMeadow\t4.9\tT\t5"                           "Gunness.Thicket\t3.8\t0
\tScrub\t4.2\tF\t6"
 [7] "Oak.Mead\t3.1\t2\tGrassland\t3.9\tF\t2"                           "Church.Field\t3.5\t3\tG
rassland\t4.2\tF\t3"
 [9] "Ashurst\t2.1\t0\tArable\t4.8\tF\t4"                               "The.Orchard\t1.9\t0\tOr
chard\t5.7\tF\t9"
[11] "Rookery.Slope\t1.5\t4\tGrassland\t5\tT\t7"                        "Garden.Wood\t2.9\t10\tS
crub\t5.2\tF\t8"
[13] "North.Gravel\t3.3\t1\tGrassland\t4.1\tF\t1"                       "South.Gravel\t3.7\t2\tG
rassland\t4\tF\t2"
[15] "Observatory.Ridge\t1.8\t6\tGrassland\t3.8\tF\t0"                  "Pond.Field\t4.1\t0\tMea
dow\t5\tT\t6"
[17] "Water.Meadow\t3.9\t0\tMeadow\t4.9\tT\t8"                          "Cheapside\t2.2\t8\tScru
b\t4.7\tT\t4"
[19] "Pound.Hill\t4.4\t2\tArable\t4.5\tF\t5"                            "Gravel.Pit\t2.9\t1\tGra
ssland\t3.5\tF\t1"
[21] "Farm.Wood\t0.8\t10\tScrub\t5.1\tT\t3"
```

Hide

```
db<-strsplit(line,"\t")
db
```

```
[[1]]
[1] "Field.Name"   "Area"         "Slope"        "Vegetation"   "Soil.pH"      "Damp"         "W
orm.density"

[[2]]
[1] "Nashs.Field" "3.6"         "11"          "Grassland"   "4.1"         "F"           "4"

[[3]]
[1] "Silwood.Bottom" "5.1"           "2"             "Arable"        "5.2"           "F"
"7"

[[4]]
[1] "Nursery.Field" "2.8"           "3"             "Grassland"     "4.3"           "F"
"2"

[[5]]
[1] "Rush.Meadow" "2.4"         "5"           "Meadow"      "4.9"         "T"           "5"

[[6]]
[1] "Gunness.Thicket" "3.8"             "0"               "Scrub"           "4.2"
"F"               "6"

[[7]]
[1] "Oak.Mead"  "3.1"       "2"         "Grassland" "3.9"       "F"         "2"

[[8]]
[1] "Church.Field" "3.5"          "3"            "Grassland"    "4.2"          "F"
"3"

[[9]]
[1] "Ashurst" "2.1"     "0"       "Arable"  "4.8"     "F"       "4"

[[10]]
[1] "The.Orchard" "1.9"         "0"           "Orchard"     "5.7"         "F"           "9"

[[11]]
[1] "Rookery.Slope" "1.5"           "4"             "Grassland"     "5"             "T"
"7"

[[12]]
[1] "Garden.Wood" "2.9"         "10"          "Scrub"       "5.2"         "F"           "8"

[[13]]
[1] "North.Gravel" "3.3"          "1"            "Grassland"    "4.1"          "F"
"1"

[[14]]
[1] "South.Gravel" "3.7"          "2"            "Grassland"    "4"            "F"
"2"

[[15]]
[1] "Observatory.Ridge" "1.8"              "6"                "Grassland"        "3.8"
"F"
```

```
[7] "0"

[[16]]
[1] "Pond.Field" "4.1"        "0"          "Meadow"     "5"          "T"          "6"

[[17]]
[1] "Water.Meadow" "3.9"          "0"            "Meadow"       "4.9"          "T"
"8"

[[18]]
[1] "Cheapside" "2.2"       "8"         "Scrub"     "4.7"       "T"         "4"

[[19]]
[1] "Pound.Hill" "4.4"        "2"          "Arable"     "4.5"        "F"          "5"

[[20]]
[1] "Gravel.Pit" "2.9"        "1"          "Grassland"  "3.5"        "F"          "1"

[[21]]
[1] "Farm.Wood" "0.8"       "10"        "Scrub"     "5.1"       "T"         "3"
```

Hide

```
bb<-unlist(db)
dim(bb)<-c(7,21)
bb
```

```
     [,1]          [,2]          [,3]             [,4]           [,5]          [,6]
[,7]        [,8]           [,9]
[1,] "Field.Name"   "Nashs.Field" "Silwood.Bottom" "Nursery.Field" "Rush.Meadow" "Gunness.Thicke
t" "Oak.Mead"  "Church.Field" "Ashurst"
[2,] "Area"         "3.6"         "5.1"            "2.8"          "2.4"         "3.8"
"3.1"       "3.5"          "2.1"
[3,] "Slope"        "11"          "2"              "3"            "5"           "0"
"2"         "3"            "0"
[4,] "Vegetation"   "Grassland"   "Arable"         "Grassland"    "Meadow"      "Scrub"
"Grassland" "Grassland"    "Arable"
[5,] "Soil.pH"      "4.1"         "5.2"            "4.3"          "4.9"         "4.2"
"3.9"       "4.2"          "4.8"
[6,] "Damp"         "F"           "F"              "F"            "T"           "F"
"F"         "F"            "F"
[7,] "Worm.density" "4"           "7"              "2"            "5"           "6"
"2"         "3"            "4"
     [,10]         [,11]          [,12]         [,13]          [,14]          [,15]
[,16]        [,17]
[1,] "The.Orchard" "Rookery.Slope" "Garden.Wood" "North.Gravel" "South.Gravel" "Observatory.Ridg
e" "Pond.Field" "Water.Meadow"
[2,] "1.9"         "1.5"           "2.9"         "3.3"          "3.7"          "1.8"
"4.1"        "3.9"
[3,] "0"           "4"             "10"          "1"            "2"            "6"
"0"          "0"
[4,] "Orchard"     "Grassland"     "Scrub"       "Grassland"    "Grassland"    "Grassland"
"Meadow"     "Meadow"
[5,] "5.7"         "5"             "5.2"         "4.1"          "4"            "3.8"
"5"          "4.9"
[6,] "F"           "T"             "F"           "F"            "F"            "F"
"T"          "T"
[7,] "9"           "7"             "8"           "1"            "2"            "0"
"6"          "8"
     [,18]       [,19]        [,20]        [,21]
[1,] "Cheapside" "Pound.Hill" "Gravel.Pit" "Farm.Wood"
[2,] "2.2"       "4.4"        "2.9"        "0.8"
[3,] "8"         "2"          "1"          "10"
[4,] "Scrub"     "Arable"     "Grassland"  "Scrub"
[5,] "4.7"       "4.5"        "3.5"        "5.1"
[6,] "T"         "F"          "F"          "T"
[7,] "4"         "5"          "1"          "3"
```

Hide

```
t(bb)[-1,]
```

```
      [,1]               [,2]  [,3] [,4]        [,5]  [,6] [,7]
 [1,] "Nashs.Field"      "3.6" "11" "Grassland" "4.1" "F"  "4"
 [2,] "Silwood.Bottom"   "5.1" "2"  "Arable"    "5.2" "F"  "7"
 [3,] "Nursery.Field"    "2.8" "3"  "Grassland" "4.3" "F"  "2"
 [4,] "Rush.Meadow"      "2.4" "5"  "Meadow"    "4.9" "T"  "5"
 [5,] "Gunness.Thicket"  "3.8" "0"  "Scrub"     "4.2" "F"  "6"
 [6,] "Oak.Mead"         "3.1" "2"  "Grassland" "3.9" "F"  "2"
 [7,] "Church.Field"     "3.5" "3"  "Grassland" "4.2" "F"  "3"
 [8,] "Ashurst"          "2.1" "0"  "Arable"    "4.8" "F"  "4"
 [9,] "The.Orchard"      "1.9" "0"  "Orchard"   "5.7" "F"  "9"
[10,] "Rookery.Slope"    "1.5" "4"  "Grassland" "5"   "T"  "7"
[11,] "Garden.Wood"      "2.9" "10" "Scrub"     "5.2" "F"  "8"
[12,] "North.Gravel"     "3.3" "1"  "Grassland" "4.1" "F"  "1"
[13,] "South.Gravel"     "3.7" "2"  "Grassland" "4"   "F"  "2"
[14,] "Observatory.Ridge" "1.8" "6"  "Grassland" "3.8" "F"  "0"
[15,] "Pond.Field"       "4.1" "0"  "Meadow"    "5"   "T"  "6"
[16,] "Water.Meadow"     "3.9" "0"  "Meadow"    "4.9" "T"  "8"
[17,] "Cheapside"        "2.2" "8"  "Scrub"     "4.7" "T"  "4"
[18,] "Pound.Hill"       "4.4" "2"  "Arable"    "4.5" "F"  "5"
[19,] "Gravel.Pit"       "2.9" "1"  "Grassland" "3.5" "F"  "1"
[20,] "Farm.Wood"        "0.8" "10" "Scrub"     "5.1" "T"  "3"
```

Hide

```
frame<-as.data.frame(t(bb)[-1,])
head(frame)
```

	V1 <fctr>	V2 <fctr>	V3 <fctr>	V4 <fctr>	V5 <fctr>	V6 <fctr>	V7 <fctr>
1	Nashs.Field	3.6	11	Grassland	4.1	F	4
2	Silwood.Bottom	5.1	2	Arable	5.2	F	7
3	Nursery.Field	2.8	3	Grassland	4.3	F	2
4	Rush.Meadow	2.4	5	Meadow	4.9	T	5
5	Gunness.Thicket	3.8	0	Scrub	4.2	F	6
6	Oak.Mead	3.1	2	Grassland	3.9	F	2

6 rows

Hide

```
names(frame)<-t(bb)[1,]
head(frame)
```

	Field.Name <fctr>	Area <fctr>	Slope <fctr>	Vegetation <fctr>	Soil.pH <fctr>	Da… <fctr>	Worm.density <fctr>

	Field.Name <fctr>	Area <fctr>	Slope <fctr>	Vegetation <fctr>	Soil.pH <fctr>	Da… <fctr>	Worm.density <fctr>
1	Nashs.Field	3.6	11	Grassland	4.1	F	4
2	Silwood.Bottom	5.1	2	Arable	5.2	F	7
3	Nursery.Field	2.8	3	Grassland	4.3	F	2
4	Rush.Meadow	2.4	5	Meadow	4.9	T	5
5	Gunness.Thicket	3.8	0	Scrub	4.2	F	6
6	Oak.Mead	3.1	2	Grassland	3.9	F	2

6 rows

Hide

```
NA
NA
```

3.4.2 Reading non-standard files using readLines

Hide

```
readLines("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt")
strsplit(readLines("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt"),
"\t")
strsplit(readLines("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/rt.txt"),
"\n")

rows<-lapply(strsplit(readLines("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therboo
k/rt.txt"),"\t"),as.numeric)
rows

sapply(1:5, function(i) as.numeric(na.omit(rows[[i]])))
```

3.5 Warnings when you attach the dataframe

Hide

```
murder <- read.table("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/murders.tx
t",header=T,as.is="region")
attach(murder)
```

```
The following object is masked _by_ .GlobalEnv:

    murder

The following objects are masked from murder (pos = 4):

    murder, population, region, state
```

Hide

```
head(murder)
```

	state	population	murder	region
	<fctr>	<int>	<dbl>	<chr>
1	Alabama	3615	15.1	South
2	Alaska	365	11.3	West
3	Arizona	2212	7.8	West
4	Arkansas	2110	10.1	South
5	California	21198	10.3	West
6	Colorado	2541	6.8	West

6 rows

Hide

```
table(region)
```

```
region
North.Central     Northeast         South          West
           12             9            16            13
```

Hide

```
table(murder$region)
```

```


North.Central     Northeast         South          West
           12             9            16            13
```

3.6

Hide

```
z <- 10
z <- 2.5
```

3.7

Hide

```
data<-read.table("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/catdata.txt",h
eader=F)
```

```
cannot open file 'C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/catdata.txt':
No such file or directoryError in file(file, "rt") : cannot open the connection
```

3.8 checking files from the command line

Hide

```
file.exists("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/Decay.txt")
```

3.11 File Paths

Hide

```
setwd("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/thesis/chapter1/data")
```

```
Error in setwd("C:/Users/Nathan/Desktop/Important Docs/school/stats db/therbook/thesis/chapter1/
data") :
  cannot change working directory
```

3.12 Connections

Hide

```
file(description = "", open = "", blocking = TRUE,
     encoding = getOption("encoding"), raw = FALSE)
```

```
A connection with
description ""
class       "file"
mode        "w+"
text        "text"
opened      "opened"
can read    "yes"
can write   "yes"
```

3.13.2 Setting up R to read from the database

Hide

```
install.packages("RODBC")
```

```
WARNING: Rtools is required to build R packages but is not currently installed. Please download
and install the appropriate version of Rtools before proceeding:

https://cran.rstudio.com/bin/windows/Rtools/
Installing package into 愀鞄C:/Users/Nathan/Documents/R/win-library/3.6愀牷
(as 愀鞄lib愀牷 is unspecified)
trying URL 'https://cran.rstudio.com/bin/windows/contrib/3.6/RODBC_1.3-16.zip'
Content type 'application/zip' length 880331 bytes (859 KB)
downloaded 859 KB
```

```
package ‘RODBC’ successfully unpacked and MD5 sums checked

The downloaded binary packages are in
    C:\Users\Nathan\AppData\Local\Temp\RtmpcjCMF3\downloaded_packages
```

Hide

```
library(RODBC)
channel <- odbcConnect("northwind")
```

```
[RODBC] ERROR: state IM002, code 0, message [Microsoft][ODBC Driver Manager] Data source name no
t found and no default driver specifiedODBC connection failed
```

Hide

```
query <- "SELECT * FROM Categories"
stock <- sqlQuery(channel, query)
```

```
Error in sqlQuery(channel, query) :
  first argument is not an open RODBC channel
```